

REMARKS/ARGUMENTS

Claims 14-16 and 20-25 are pending, with claims 20-25 having been withdrawn. By this Amendment, claim 14 is being amended to improve its form. No new matter is involved.

This Amendment is responsive to the Final Office Action of December 12, 2005. Beginning with Paragraph 2 of that Office Action, claims 14-16 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 5,608,556 of Koma in view of U.S. Patent 5,434,690 of Hisatake, et al. This rejection is respectfully traversed, particularly in view of claim 14 as amended herein.

Claim 14 is being amended in order to recite "vertically aligned liquid crystal" rather than "a vertically aligned liquid crystal layer". In addition, a paragraph is being added to claim 14, which reads "said liquid crystal is vertically aligned with respect to a plane of a substrate and light is blocked in said display when no voltage is applied to said liquid crystal and an amount of emission light emitted from said display is adjusted by said liquid crystal tilting from a vertically aligned state according to an applied voltage when a voltage is applied to said liquid crystal". Further, claim 14 is being amended to recite that each of the plurality of orientation controllers "is associated with a corresponding one of said plurality of pixel electrodes" and one of the plurality of orientation controllers "is disposed between two of said slits". The limitation that light is blocked in the display when no voltage is applied to the liquid crystal and light is emitted from the display when a voltage is applied, is described at line 19 of page 4 through line 10 of page 5 of the original application upon which this application is based.

According to the Office Action, "It would have been obvious to one of ordinary skill in the art at the time the invention was made to have each of a plurality of the pixel electrodes divided by one or more line shaped slits, in which no electrode is

present, into two or more electrode regions, which are electrically connected and arranged in parallel with each other, . . . since one would be motivated to provide a lower driving voltage while providing quick response speed (col. 3, lines 41-43) that result from the degree of freedom afforded by such a configuration (col. 9, lines 47-56)" and concludes that it would have been obvious to make the present invention based on the references to Hisatake and Koma.

However, as described below, the principles of Hisatake and the present invention are completely different from each other, and, in addition, the principles of Hisatake and Koma are completely different from each other. Therefore, one of ordinary skill in the art would never be motivated to combine Hisatake and Koma, because combining of these two references would result in a display that cannot display. In other words, this combination is, for all practical purposes, not possible.

In the case of the present invention, as defined in Claim 14 as amended herein, the liquid crystal is vertically aligned with respect to the plane of a substrate and light is blocked when no voltage is applied. When a voltage is applied to the liquid crystal, an amount of emission light emitted from the display is adjusted by the liquid crystal tilting from a vertically aligned state according to an applied voltage. In the display in which the liquid crystal to be controlled is sealed between electrodes, a plurality of slits are formed in the pixel electrode to divide a pixel region into a plurality of electrode regions and an orientation controller is provided corresponding to each electrode region at a side of the opposing electrode so that, when a voltage is applied between a pixel electrode and an opposing electrode and the liquid crystal is tilted from the vertically aligned state, not only is the tilt from the vertical direction controlled, but also the orientation of the tilt of the liquid crystal is effectively controlled by an electric field in a tilted direction generated by the slit and the orientation controller.

With this configuration, the light can be transmitted through the liquid crystal tilting from the vertical direction and a plurality of priority viewing angles can be reliably formed in an electrode region. In addition, by employing such a configuration, the liquid crystal positioned at the slit portion is tilted, from the vertically aligned state, by a tilted electric field formed at the slit portion when a voltage is applied and the slope is transferred to each electrode region taking advantage of the continuity characteristic of the liquid crystal so that the orientation of the liquid crystal within an electrode region is defined.

Koma, on the other hand and as the admitted in the Office Action, fails to disclose provision of one or more line-shaped slits in a pixel electrode to form a plurality of electrode regions and provision of an orientation controller corresponding to each electrode region on the side of the opposing electrode. Koma also fails to disclose the necessity for dividing a pixel region into a plurality of electrode regions and controlling the orientation in each electrode region.

Hisatake discloses formation of a plurality of slits in a periodic manner in a pixel electrode and formation of slits in a periodic manner in an opposing electrode. In Hisatake, however, the plurality of slits are formed in order to cause scattering of light in the liquid crystal layer by forming regions of different alignment states in a pixel in a periodic manner when a voltage is applied between the pixel electrode and the opposing electrode. In Hisatake, by forming regions of different predetermined alignment states in a periodic manner in a liquid crystal layer within a pixel, a refractive lens effect or a diffractive grating effect is created and scattering of light is generated. When such a scattering of light occurs, light entering the liquid crystal layer is scattered and is not emitted outside. In other words, the slits of Hisatake are provided in order to cause scattering of light and to display black by blocking the light when a voltage is applied between the pixel electrode and the opposing electrode.

As described in Hisatake, the slits are formed in a periodic manner in the pixel electrode and in the opposing electrode so that scattering of light occurs when a voltage is applied between the pixel electrode and the opposing electrode.

In addition, in Hisatake, when light is to be emitted from the display, no voltage is applied between the electrodes. Hisatake fails to disclose resolution of the problem of the viewing angle dependency caused by the liquid crystal. Fundamentally, the problem of the viewing angle dependency cannot be resolved by applying a voltage in Hisatake.

Thus, neither Koma nor Hisatake recognizes the meaning of dividing a pixel region into a plurality of electrode regions and control of orientation within the electrode regions when a voltage is applied to liquid crystal by a pixel electrode and an opposing electrode. That is, neither Koma nor Hisatake recognizes that display quality of a pixel as a whole and operation speed can be improved by reliably and quickly controlling, in each electrode region, the tilting direction of the liquid crystal by a tilted electric field generated by the slit and the orientation controller as described above.

The attempted combination of Koma and Hisatake would correspond to a combination of a mode disclosed in Koma in which black is displayed when no voltage is applied (normally black mode) and Hisatake. However, because the combined structure is of normally black mode, light is blocked when no voltage is applied and, in addition, because the slit structure of Hisatake is employed, scattering of light occurs in the liquid crystal layer when a voltage is applied, and, thus, no light is emitted when a voltage is applied. In other words, the combined configuration would result in a display which always displays black, and, thus, the display could not function as a display. Therefore, the combination of Koma and Hisatake is fundamentally impossible and, therefore, one of ordinary skill in the art

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would not combine Koma and Hisatake having a slit shape for displaying black through scattering of light.

Therefore, claim 14 as amended herein is submitted to clearly distinguish patentably over the attempted combination of references.

Claims 15 and 16 depend from and contain all of the limitations of claim 14, so that such claims are also submitted to clearly distinguish patentably over the cited art.

In conclusion, claims 14-16 are submitted to clearly distinguish patentably over the prior art for the reasons discussed above. Therefore, reconsideration and allowance are respectfully requested.

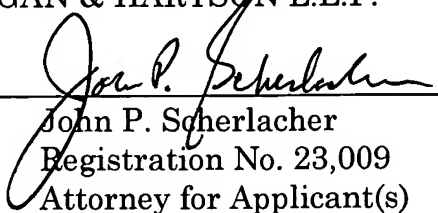
If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles, California telephone number (213) 337-6846 to discuss the steps necessary for placing the application in condition for allowance.

If there are any fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-1314.

Respectfully submitted,
HOGAN & HARTSON L.L.P.

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By: _____


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